

CLAIMS

1. An image processing method of generating an image of a virtual space formed from a virtual object including at least one part, characterized by

5 comprising:

a first acquisition step of acquiring a position and orientation of a viewpoint of an observer;

a second acquisition step of acquiring a position and orientation of a pointing device which is worn by
10 the observer on a hand to execute various kinds of operations;

a layout step of laying out a list image to display a list of pieces of information about the parts near the position acquired in the second acquisition
15 step;

a virtual space image generation step of generating the image of the virtual space after laying out the list image, which is seen in accordance with the position and orientation of the viewpoint; and
20 an output step of outputting the image generated in the virtual space image generation step to a predetermined display device.

2. The method according to claim 1, characterized in
25 that in the layout step, the list image is laid out while making a plane of the list image, on which the pieces of information about the parts are described,

visible from the position and orientation of the viewpoint.

3. The method according to claim 1, characterized in
5 that in the layout step, the list image is laid out at
a position that internally divides a line segment
connecting the position acquired in the first
acquisition step and the position acquired in the
second acquisition step to $t : (1-t)$.

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4. The method according to claim 1, characterized by
further comprising a layout control step of controlling
processing in the layout step in accordance with an
instruction whether to display the list image to switch
15 whether to contain the list image in the virtual space
image.

5. The method according to claim 1, characterized by
further comprising a conversion step of converting the
20 list image into a semitransparent image in accordance
with an instruction to change the list image to the
semitransparent image.

6. The method according to claim 1, characterized by
25 further comprising

a determination step of determining on the basis
of the position and orientation of the viewpoint and a

position of the virtual object whether the virtual object is present in a direction of line of sight of the viewpoint, and

a transparency control step of, when it is

- 5 determined in the determination step that the virtual object is present, making a transparency of the list image higher than that when it is determined in the determination step that the virtual object is not present.

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7. The method according to claim 1, characterized by further comprising

- a distance calculation step of calculating a distance between the position of the pointing device
15 and the position of the virtual object, and

- a list image generation step of generating the list image to display the list of pieces of information about the parts up to a layer level corresponding to the distance calculated in the distance calculation
20 step in a hierarchical structure of the parts included in the virtual object.

8. The method according to claim 1, characterized in that the list image is an image to display a list of
25 pieces of information about, of the parts included in the virtual object, a part at a position closest to the position of the pointing device acquired in the second

acquisition step.

9. The method according to claim 1, characterized in that in the virtual space image generation step, when
5 the list image overlaps a hand region in the physical space image acquired in the physical space image acquisition step, the image of the virtual space is generated on the basis of priority data to designate which of the hand region and the list image should be
10 rendered in front.

10. The method according to claim 9, characterized by further comprising a designation step of designating which of the hand region and the list image should be
15 rendered in front,

wherein in the designation step, designated contents are set to the priority data.

11. An image processing method of generating a
20 virtual image corresponding to a position and orientation of an observer and compositing the virtual image with a physical image corresponding to the position and orientation of the observer, including
acquiring the position and orientation of the
25 observer,

generating the virtual image in accordance with the position and orientation of the observer, and

compositing the physical image corresponding to the position and orientation of the observer with the virtual image, characterized by comprising:

acquiring a position of pointing means operated
5 by the observer;

identifying a part pointed by the pointing means;

generating a part information virtual image to display information about the identified part; and

determining a layout position of the part
10 information virtual image in accordance with the position of the pointing means.

12. The method according to claim 11, characterized in that the layout position is determined in accordance
15 with the position of the pointing means and the position and orientation of the observer.

13. The method according to claim 11, characterized in that the information about the part comprises a list
20 of a plurality of parts associated with the identified part.

14. An image processing apparatus of generating an image of a virtual space formed from a virtual object
25 including at least one part, characterized by comprising:

first acquisition unit adapted to acquire a

position and orientation of a viewpoint of an observer;

second acquisition unit adapted to acquire a
position and orientation of a pointing device which is
worn by the observer on a hand to execute various kinds
5 of operations;

layout unit adapted to lay out a list image to
display a list of pieces of information about the parts
near the position acquired by said second acquisition
unit;

10 virtual space image generation unit adapted to
generate the image of the virtual space after laying
out the list image, which is seen in accordance with
the position and orientation of the viewpoint; and
output unit adapted to output the image generated
15 by said virtual space image generation unit to a
predetermined display device.

15. An image processing apparatus of generating a
virtual image corresponding to a position and
20 orientation of an observer and compositing the virtual
image with a physical image corresponding to the
position and orientation of the observer, comprising:
acquiring unit adapted to acquire the position
and orientation of the observer,
25 generating unit adapted to generate the virtual
image in accordance with the position and orientation
of the observer, and.

compositing unit adapted to composite the physical image corresponding to the position and orientation of the observer with the virtual image, characterized by comprising:

5 acquiring unit adapted to acquire a position of pointing means operated by the observer;

identifying unit adapted to identify a part pointed by the pointing means;

generating unit adapted to generate a part
10 information virtual image to display information about the identified part; and

determining unit adapted to determining a layout position of the part information virtual image in accordance with the position of the pointing means.

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16. A program characterized by causing a computer to execute an image processing method of claim 1.

17. A program characterized by causing a computer to
20 execute an image processing method of claim 11.